28. EFFECT OF METEPA ON SOME LARVAL TISSUES OF *MUSCA DOMESTICA NEBULO*

(*With thirteen text-figures*)

Introduction

Recently experiments have been conducted by various workers which show cytological effects of many chemosterilants. For example the germ cell chromosomes fragmented and chromatin clumped and stained atypically when male house flies were treated with apholate or tepa. When female of the house flies were fed on the hempa or apholate, chromatin clumping and vacuolation of the oocytes and nurse cells were caused. In some instances it was followed by degeneration of the cytoplasm and atrophy of the follicular epithelium. All results indicate that both the severity and type of injury produced were frequently more dependent on dosage than on the type of chemosterilant used. Such an experimental evidence goes to suggest that chemosterilants induce sexual sterility by clumping of chromatin, vacuolation of oocytes and degeneration of follicular cells, nurse cells and the germ cell chromosomes in adult house flies. But in what manner the immature stages are affected in the house fly *Musca domestica nebulo*, yet remains to be seen.

In the line of information given above it was considered feasible to see the effect of metepa by treating the eggs and observing any histopathological effects on the larval tissues of the house fly.

Materials and Methods

The flies used during the present studies were obtained from a normal laboratory stock that is being maintained since 1961 at a temperature of 28±1°C and 60 to 70 per cent relative humidity. The flies lay eggs on cotton pads soaked in diluted buffalo milk in the dishes which were replaced by fresh petri dishes at twenty four hours interval. The freshly laid eggs were carefully transferred along with the cotton pads into glass jars for further development. These jars were covered with cloth in order to prevent the larvae from escaping. On the sixth day a layer of dry cotton was added for the pupation of larvae. The pupae were sorted out and kept in petri dishes in cages for the adults to emerge. In order to determine the effect of metepa two hundred eggs from the normal flies were obtained, half of them were allowed to develop without any treatment (served as control) and the remaining hundred were dipped in ethanol solution of metepa of 0.0156 per cent for fifteen minutes. This strength of the ethanol solution by experience was found to be the maximum effective concentration without too much mortality. Living larvae of the first, second and third instar were collected at desired time intervals, fixed and sectioned to see the progress of damage done to the tissues. The idea behind this set of experiments was to determine within possible limitations the cause of mortality of larval stages.

Result and Discussion

The chief interest of workers employing chemosterilizing technique has been to effect a reduction in the population of harmful insects. Their data regarding the efficiency of this system are based on the rate of mortality

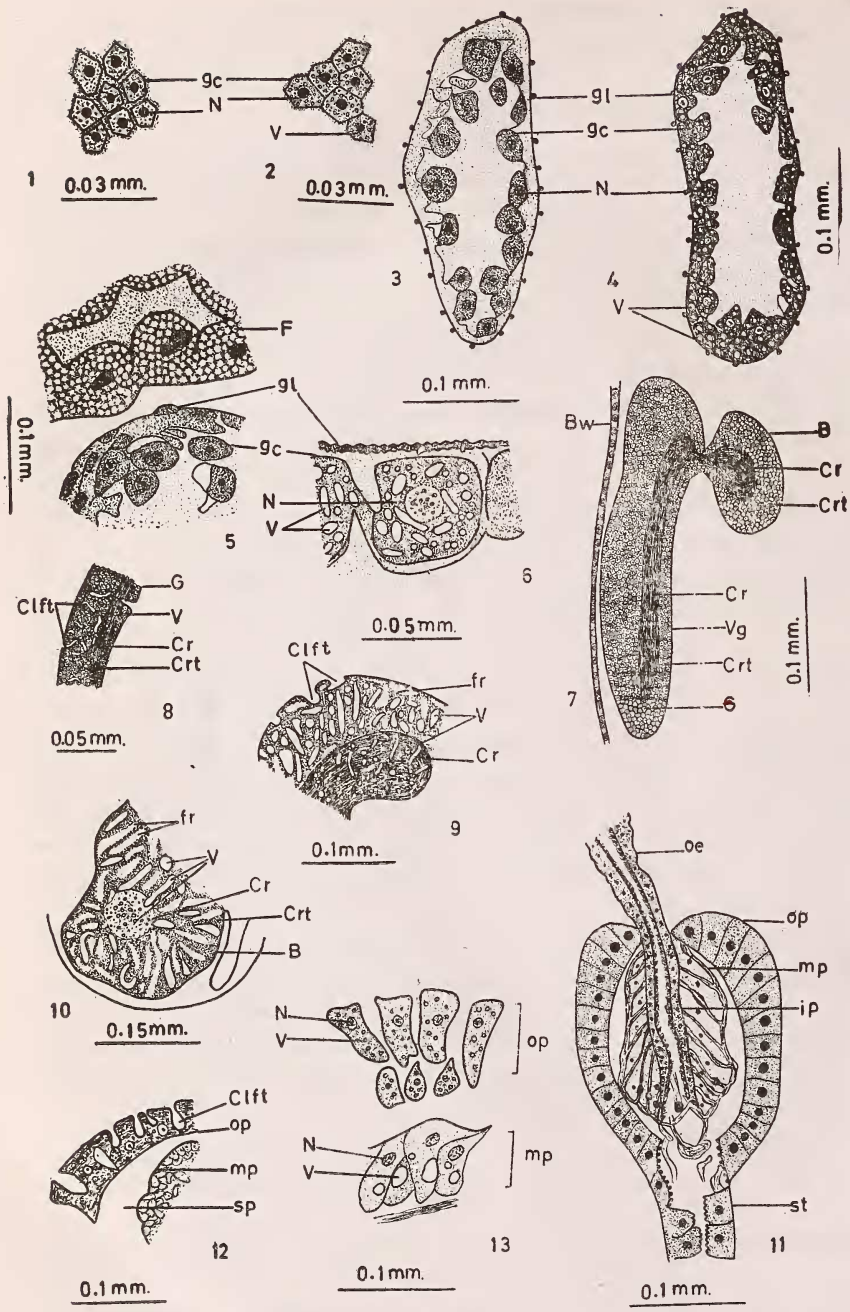

Fig. 1. L.S. of germ cells of normal first instar larva. Fig. 2. Germ cells in the longitudinal section of a first instar metepa treated larva, showing vacuolization of germ cells. Fig. 3. Gonads in the longitudinal section of a second instar normal larva. Fig. 4. Gonads in the longitudinal section of second instar treated larva, showing vacuoles in the germ cells. Fig. 5. An enlarged portion of gonads in the longitudinal section of a third instar normal larva. Fig. 6. An enlarged portion of gonads in the longitudinal section of third instar treated larva, showing larger vacuoles in the germ cells. Fig. 7. Nervous system in longitudinal section of a first instar normal larva, showing brain hemisphere and ventral ganglion. Fig. 8. A portion of ventral ganglion in the longitudinal section of first instar treated larva, note in the core region showing vacuoles and cortical, region showing clefts in between the ganglion cells. Fig. 9. Anterior portion of ventral ganglion in the longitudinal section of treated larva, showing fragmentation of tissue. Fig. 10. Brain hemisphere in the longitudinal section of third instar treated larva, showing vacuolization and fragmentation of tissue. Fig. 11. Proventriculus in a longitudinal section of second instar normal larva, showing the three layers. Fig. 12. A portion of Proventriculus in a longitudinal section of second instar treated larva, showing clefts and vacuolization. Fig. 13. A portion of proventriculus in a longitudinal section of a third instar treated larva, showing fragmentation of tissue.

of various stages of development and the inhibition of the reproductive process in the adults. Few papers, nevertheless, deal with the histological changes that are either the result of toxicity of these chemicals, severly injuring the chromosomes of the sperm and the ovum, or merely interfere with the physiological processes culminating in the failure of the female to oviposit. The later is considered as good criterion in the evaluation of a compound as a chemosterilant. Metepa that has been used in the present experiment in maximum effective concentration without too much mortality (0.0156%) on the eggs of house fly can be considered as a chemical which does not show any marked effect on the germ cells in the first instar larva. A varying degree of vacuolization is however, seen in the tissues of the first instar but without any sign of histolysis in the affected tissue. Besides this there is no other evidence available in the tissues of the first instar larva which could be regarded as relevant from the histopathological point of view. In the later instars a marked degree of fragmentation along with vacuolization is seen in the region of the proventriculus, brain and ventral ganglion. This fragmentation progressively becomes more pronounced in the third instar larva as compared with the section of the normal larva of corresponding stage. The fragmented region shows a dissolution of the cells causing cleft between the healthy tissues. This may be taken as an evidence of the toxic effect of the chemical.

Further, the sterilizing quality assigned to metepa does not seem to express itself during the immature stages. Its sterilizing quality may be evident in the adult flies which would hatch from the treated eggs.

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